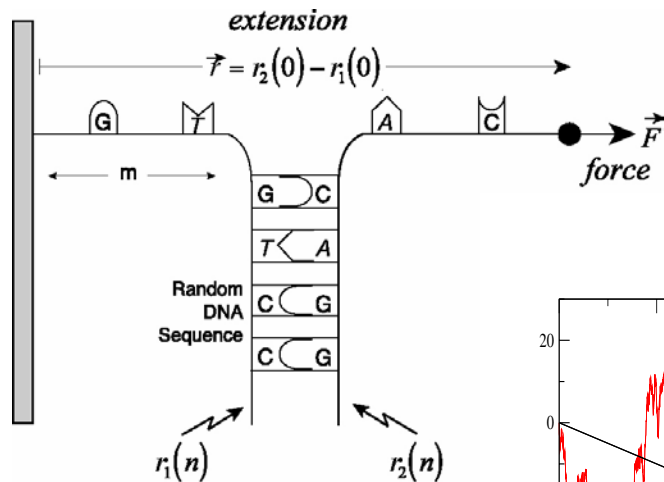


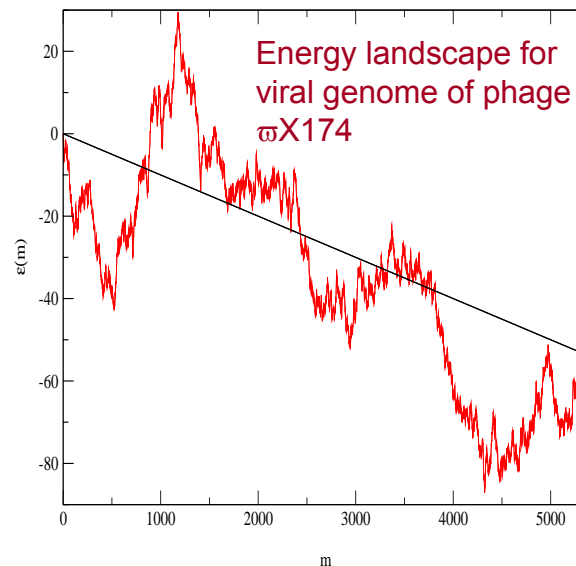
DNA unzipped under a constant force exhibits sequence-dependent pauses and jumps

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DNA replication forks, important in cell division, exhibit pauses and jumps, thought to be associated with proofreading and repair. Single molecule experiments on “unzipping forks” can be used to model this process.



Sequence heterogeneity (see energy landscape at right) dominates the dynamics within ~ 7 pN of the ~ 15 pN DNA unzipping transition under physiological conditions.



- A theory of DNA unzipping at a constant force (D. K. Lubensky and drn, Phys. Rev. E65, 031917 (2002)] predicts pauses and jumps simply due *sequence heterogeneity*. The barriers scale as $k_B T \propto M$, where M is the genome size.
- Recent experiments on lambda phage DNA by Danilowicz et. al. [PNAS 100, 1694 (2003)] confirm important aspects of the theory, including large energy barriers and sequence-specific pause points.

